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# *Douglasia beringensis* (Primulaceae): A New Species from Northwestern Alaska

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**ABSTRACT.** *Douglasia beringensis*, a new species from the Seward Peninsula in the Bering Strait region of Alaska, is described, illustrated, and compared to its closest arctic allies. A key is provided for the nine species of *Douglasia* recognized in North America, and a discussion of the Russian and American taxonomic concepts of the genus is given.

***Douglasia beringensis*** S. Kelso, Yurtsev & D. F. Murray, sp. nov. TYPE: U.S.A. Alaska: Bering Land Bridge National Preserve, Seward Peninsula, Trail Creek Hills ca. 44 km SW of Deering, 65°48'37"N, 163°23'61"W, on calcite marble outcrops, 350 m, 12 July 1992, Murray *et al.* 10679 (holotype, ALA; isotypes, COLO, LE, MO, US). Figure 1.

Herbae perennes caespitosae, pulvinos vel tegetes formantes. Folia superiora rosulata, erecta, varie linearia vel anguste oblonga, 5–8 mm longa, 1–1.5 mm lata, pilis stellatis et ramosis in facie superiore et inferiore, apice plus minusve revoluta. Pedunculi floriferi 1.0–10.0 mm, fructiferi usque ad 6 cm longi, pilis brevibus ramosis et stellatis tecti. Inflorescentia uniflora (rarissime biflora), involucreta; bractea plerumque 1. Calyx et bractea dense pubescens pilis stellatis et ramosis. Corolla juvenalis rosea, postea albescens, tubo 3–4 mm, limbo ca. 5 mm. Semina 1–4, castanea, quadrata vel oblongata, ca. 2 mm × 1 mm.

Herbs perennial, in loosely caespitose cushions or mats, with branched caudex and slender tap root

with numerous filiform adventive roots. Stems prostrate to ascending, with imbricate, reddish, marcescent leaves below and terminal green leaf rosettes above, leaves on lower part of annual shoot usually ± remote. Leaves prominently ascending, linear to oblong, obtuse to slightly acute, 5–8 × 1–1.5 mm, densely covered with minute branched hairs on both surfaces, slightly revolute at apex, margins entire. Peduncles 1.0–10 mm in early anthesis, elongating to ca. 6 cm in fruit, densely pubescent with branched and stellate hairs throughout. Inflorescences involucreta; bract single or occasionally lacking, lanceolate to lanceolate-ovate, acute, 2–3 × 0.5–0.75 mm, pubescent with stellate hairs. Flowers 1(–2), sessile; calyces broadly campanulate, ca. 4 mm long × 3–4 mm wide, divided to middle, lobes acute to acuminate, ca. 1 mm wide, entire calyx densely pubescent with minute stellate and branched hairs; corollas salverform, constricted at the throat, tube 3–4 mm long, lobes ca. 2 × 1 mm, apex entire, limb pink, turning white in age, 5–7 mm diam. Stamens 5, included, anthers oblong, ca. 0.5 mm long. Style 1.5–2 mm long, stigma capitate. Capsule ovate, slightly shorter than calyx. Seeds 1–4, quadrate to oblong, ca. 2 mm long × 1.5 mm wide, coat chestnut brown, reticulate.

*Distribution.* Known from two locations 8 km apart in the north-central Seward Peninsula near the northeast edge of the Bering Land Bridge National Preserve. A third report for Conglomerate Mountain in the Kokrines Hills (64°56'N, 154°42'W) ca. 450 km east of the others is based on a poor specimen at ALA (*Miller 1602* in 1926) for which the determination is equivocal. Nevertheless, it does show the distinctive stellate pubescent calyces di-

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<sup>1</sup>The transliteration of this surname from the Russian varies. The currently accepted spelling, and the one the author prefers, is Yurtsev; previous transliterations have adopted the spelling Jurtsev, and this was the one included by Brummit & Powell in *Authors of Plant Names* (Royal Botanic Gardens, Kew: 1992).

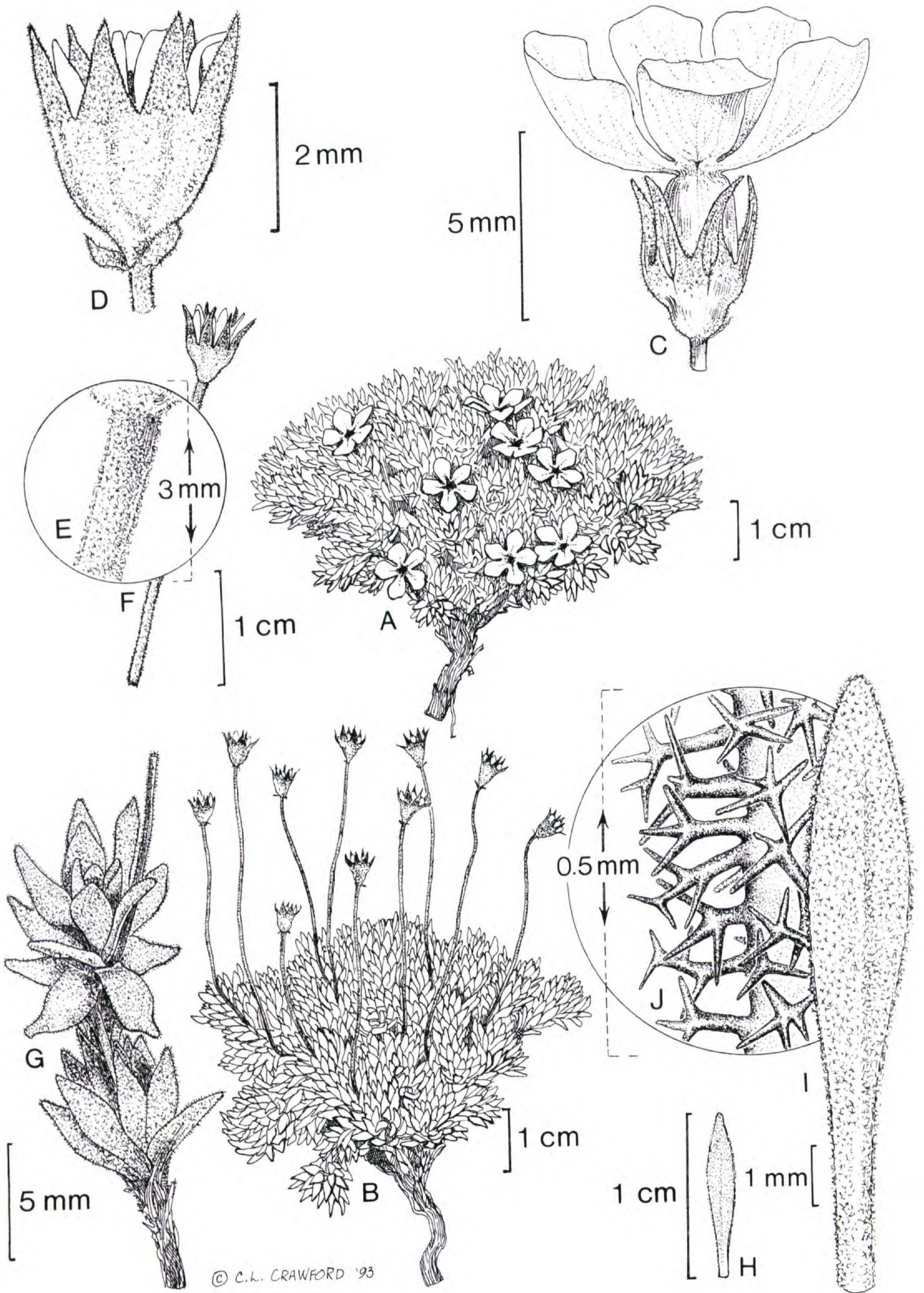


Figure 1. *Douglasia beringensis* S. Kelso, Jurtzev & D. F. Murray. —A. Plant in flower —B. Plant in fruiting stage. —C. Flower. —D. Capsule. —E, F. Pedicel with stellate pubescence. —G. Leaf rosettes. —H–J. Leaf with details of diagnostic pubescence.

agnostic for *D. beringensis*, and on that basis we report it here.

On the Seward Peninsula, *Douglasia beringensis* is locally abundant on Paleozoic marble outcrops, but it has not yet been found on other carbonate formations there. Associated species are the vascular plants *Oxytropis bryophila* (Greene) Jurtsev, *Smeilowskia calycina* (Stephan ex Willdenow) C. A. Meyer var. *porsildii* Drury & Rollins, *Draba palanderiana* Kjellman, *Poa glauca* M. Vahl, *Carex rupestris* Allioni, *Minuartia obtusiloba* (Rydberg) House, *Saxifraga oppositifolia* L., and fruticose lichens (det. M. Andreev) *Thamnolia subuliformis* (Ehrhart) W. Culberson, *Cetraria nivalis* (L.) Acharius, *C. tilesii* Acharius, and *Ochrolechia frigida* (Swartz) Lynge.

*Paratype*. U.S.A. **Alaska**: Bering Land Bridge National Preserve, Seward Peninsula, Cross Fox Butte, 65°148'14"N, 163°119'04"W, 600 m, 5 July 1993, Murray & Kelso 11302 (ALA, LE).

The genus *Douglasia* is primarily distributed in northwestern North America from Alaska to the Northwest Territories of Canada and south through the Rocky Mountains in British Columbia, Alberta, Washington, Idaho, Montana, and Wyoming. The genus is composed of (seven to) nine species, most with restricted distributions. Constance (1938) and Henderson (1981) have suggested that the endemism in *Douglasia* represents a classic case of allopatric speciation. Virtually no ecological or phylogenetic studies have been conducted on the genus, in part because of its tendency to grow in remote alpine areas.

While taxonomic opinions differ about generic delimitation of *Douglasia* (see below), the new species is clearly referable to that genus, joining four (or two) other species in Alaska (Fig. 2). One close ally is *D. arctica* W. Hooker, which is known from the northeast corner of Alaska and northern Yukon Territory. Like *D. arctica*, *D. beringensis* has relatively long scapes, broad calyces, and erect leaves, but it differs in having dense stellate pubescence on both leaves and calyx. Leaf pubescence in *D. arctica* is composed of simple marginal hairs only. *Douglasia beringensis* differs from *D. gormanii* Constance of the north-central Alaska Range and western Yukon in having longer scapes, more loosely caespitose growth habit, and a prominently pubescent rather than glabrous calyx. Leaf pubescence in *D. gormanii* is also composed of forked and branched hairs, but they are restricted to the margins and apex and are less dense than in *D. beringensis*. *Douglasia ochotensis* (Willdenow) Hultén

(*Androsace ochotensis* sensu Russian authors) of the Bering Strait region, Brooks Range of Alaska and Ogilvie Mountains of Yukon has distinctively recurved leaves, with simple hairs only. The fourth northern species, *D. alaskana* (Coville & Standley ex Hultén) S. Kelso (*Androsace alaskana* according to Yurtsev), is easily distinguished by its unique single-leaf rosette with long jointed hairs (Kelso, 1992). *Douglasia beringensis*, *D. arctica*, *D. ochotensis*, and *D. gormanii* form a group of closely related taxa, probably derivatives of Cordilleran taxa from the area south of the maximum extent of the Pleistocene Cordilleran Ice Sheet.

*Douglasia montana* A. Gray of Montana, Idaho, Wyoming, and British Columbia is the southern species most similar to *D. beringensis*. We speculate that penetration of an ancestral *D. montana* type into the Alaska-Yukon region may have taken place during climatic and glacial fluctuations of the early Pleistocene at a time before the migration route was blocked by glaciers. Speciation in these original populations probably occurred during subsequent interglacial periods when dry alpine areas were isolated from one another by forested valleys and lowlands. During late Pleistocene glaciation these allopatric populations persisted in remote unglaciated uplands common in Beringia at that time (Hopkins et al., 1982) and may even have expanded their ranges.

The narrow endemism of *D. beringensis* and restriction of habitat to Paleozoic marbles indicate that it may be a species of special concern for conservation and protection by the State of Alaska. Additional populations should be sought on similar bedrock in western Alaska, much of which is little known botanically. In particular, the Kokrines Hills population should be verified and further studies conducted in this region. On the Seward Peninsula, marbles of similar age and chemical composition can be found north of the village of Elim (Till et al., 1986; A. B. Till, pers. comm.), which would also be an area to survey for additional populations.

#### NORTH AMERICAN AND RUSSIAN DELIMITATION OF *DOUGLASIA*

There is some disagreement with respect to the delimitation of the genera *Douglasia* and *Androsace* (Kelso, 1992). Yurtsev (also Korobkov, 1980) refers the taxon called here *Douglasia ochotensis* to the genus *Androsace* due to the shape of its corolla (ellipsoid vs. oblongate in typical *Douglasia* species) and its broader but shorter corolla lobes. Other characters used by Yurtsev to distinguish this species as an *Androsace* rather than a *Douglasia* include a pulvinate growth habit with all internodes of the

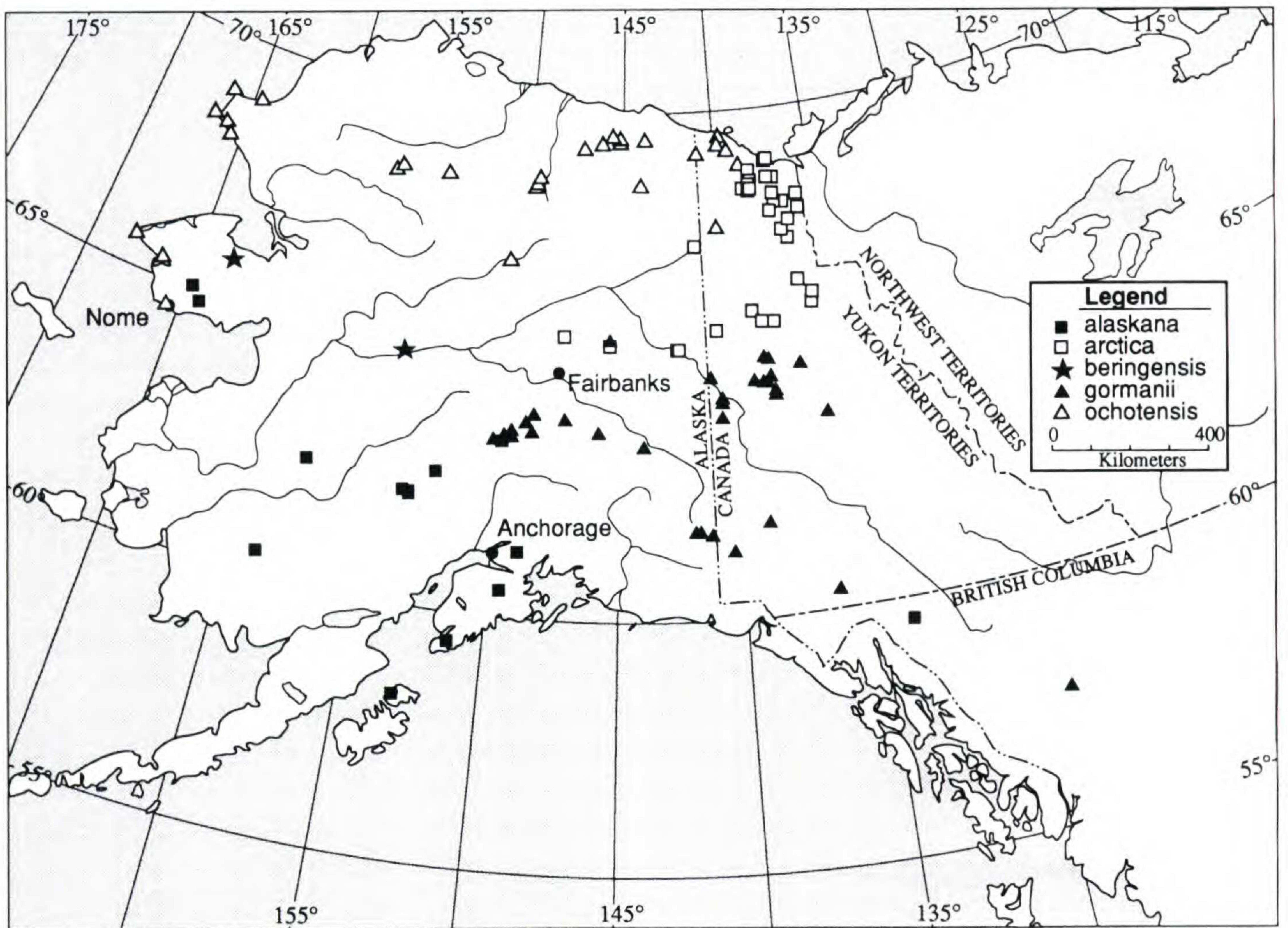


Figure 2. Distribution of northern species of *Douglasia* in North America. Dots may include multiple collections.

vegetative shoots being abbreviated or rarely elongated, even very weakly.

According to the Russian point of view, annual shoots of typical *Douglasia* spp. have the lower internodes more or less elongated, resulting in a mat rather than pulvinate growth form, and the upper leaves in a terminal rosette. In this perspective, *Douglasia* sensu stricto is a purely northwest North American endemic genus.

Because of its chromosome number of  $2n = 38$  (consistent with other North American species of

*Douglasia*) and other vegetative and reproductive characteristics, Kelso (1992) placed the former *Androsace alaskana* into *Douglasia*. However, Yurtsev (also Korobkov, 1980) prefers to keep this species in *Androsace* sect. *Andraspis* (Duby) Koch, which includes annual to biennial, mostly diploid ( $2n = 20$ ), rosette-forming herbs and a number of perennial, mostly polyploid ( $2n = 40$ ), species, such as *Androsace triflora* Adams, *A. gorodkovii* Ovczinnikov & Karavaev, and *A. semiperennis* Jurtzev.

#### KEY TO THE SPECIES OF *DOUGLASIA* IN NORTH AMERICA

- 1a. Plants with a single basal leaf rosette . . . . . *D. alaskana* (Coville & Standley ex Hultén) S. Kelso
- 1b. Plants with multiple rosettes or caespitose cushions.
  - 2a. Stems  $\pm$  densely covered with marcescent leaves.
    - 3a. Leaves glabrous above, margins ciliate with simple hairs only . . . . . *D. arctica* W. Hooker
    - 3b. Leaves generally pubescent above, sometimes only at the apex, margins with simple, forked or branched hairs.
      - 4a. Leaves prominently recurved, with simple hairs only; stems with internodes abbreviated . . . . . *D. ochotensis* (Willdenow) Hultén
      - 4b. Leaves not prominently recurved, with mostly forked or branched hairs; stems with internodes elongated.
        - 5a. Calyx and bract glabrous . . . . . *D. gormanii* Constance

- 5b. Calyx and bract densely pubescent with branched hairs .....  
..... *D. beringensis* S. Kelso, Jurtzev & D. F. Murray
- 2b. Stems not densely covered with marcescent leaves.
  - 6a. Flowers solitary or in pairs ..... *D. montana* A. Gray
  - 6b. Flowers more than 2.
    - 7a. Leaves densely pubescent with branched or stellate hairs ..... *D. nivalis* Lindley
    - 7b. Leaves glabrous, sometimes ciliate on the margins.
      - 8a. Leaves 2 mm or less in width, involucre bracts lanceolate ... *D. idahoensis* D. Henderson
      - 8b. Leaves greater than 2 mm in width, involucre bracts ovate ..... *D. laevigata* A. Gray

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